**3GPP TSG RAN WG2 Meeting #117-e Draft R2-2203717**

**Electronic meeting, 21 Feb- 3 March, 2022**

**Title:** Draft LS to RAN1 on positioning issues needing further input

**Response to:**

**Release:** Rel-17

**Work Items:** NR\_pos\_enh-Core

**Source:** Intel (To be RAN WG2)

**To:** RAN WG1

**CC:**

**Contact Person:**

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**Attachment:**

**1. Overall Description:**

RAN2 discussed the open issues for Rel-17 NR positioning enhancements WI (open issues list can be found in R2-2202005 and R2-2201722), following issues are identified as issues requiring RAN1 input:

**Table: Issues requiring RAN1 inputs (FFS in RAN1 parameter list and UE feature list are not listed in the table)**

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| **Topic** | **Issue** | **Required RAN1 work** |
| **Mitigation of UE/TRP Rx/Tx timing delays** | **The definition of TEG is captured in the running CR of TS38.305 as*****UE Rx Timing Error Group (UE Rx TEG)****: A UE Rx TEG is associated with one or more DL timing measurements, which have the Rx timing error difference within a certain margin.* ***UE RxTx Timing Error Group (UE RxTx TEG):*** *A UE RxTx TEG is associated with one or more UE Rx-Tx time difference measurements, which have the ‘Rx timing errors+Tx timing errors’ difference within a certain margin.****UE Tx Timing Error Group (UE Tx TEG)****: A UE Tx TEG is associated with the transmissions of one or more UL SRS resources for the positioning purpose, which have the Tx timing error difference within a certain margin.****TRP Rx Timing Error Group (TRP Rx TEG):*** *A TRP Rx TEG is associated with one or more UL timing measurements, which have the Rx timing error difference within a certain margin.****TRP RxTx Timing Error Group (TRP RxTx TEG):*** *A TRP RxTx TEG is associated with one or more gNB Rx-Tx time difference measurements, which have the ‘Rx timing errors+Tx timing errors’ difference within a certain margin.****TRP Tx Timing Error Group (TRP Tx TEG):*** *A TRP Tx TEG is associated with the transmissions of one or more DL PRS resources, which have the Tx timing error difference within a certain margin.***Issue:** companies in RAN2 commented that the definitions for the different TEG are unclear. The emphasis seems to be about the association with certain measurement but still does not explain the relation to the resources involved and what reference is for the “error difference”. It is also not intuitive what the “group” in TEG refers to;RAN2 plan to use RAN1 agreements as baseline for the definition of TEGs, i.e. **Tx timing error**: Result of Tx time delay (defined below) involved in the transmission of a signal. It is the uncalibrated Tx time delay, or the remaining delay after the TRP/UE internal calibration/compensation of the Tx time delay, involved in the transmission of the DL PRS/UL SRS signals. The calibration/compensation may also include the calibration/compensation of the relative time delay between different RF chains in the same TRP/UE and may also possibly consider the offset of the Tx antenna phase centre to the physical antenna centre**Tx time delay**: From a signal transmission perspective, the time delay from the time when the digital signal is generated at baseband to the time when the RF signal is transmitted from the Tx antenna**Rx timing error**: Result of Rx time delay (defined below) involved in the reception of a signal before reporting measurements that are obtained from the signal. It is the uncalibrated Rx time delay, or the remaining delay after the UE/TRP internal calibration/compensation of the Rx time delay, involved in the reception of the DL PRS/UL SRS signals. The calibration/compensation may also include the calibration/compensation of the relative time delay between different RF chains in the same UE/TRP and may also possibly consider the offset of the Rx antenna phase centre to the physical antenna centre**Rx time delay**: From a signal reception perspective, there will be a time delay from the time when the RF signal arrives at the Rx antenna to the time when the signal is digitized and time-stamped at the baseband**UE Tx ‘timing error group’ (UE Tx TEG)**: Tx timing errors, associated with UE transmissions on one or more UL SRS resources for positioning purpose, that are within a certain margin**UE Rx ‘timing error group’ (UE Rx TEG)**: Rx timing errors, associated with UE reporting of one or more DL measurements (RSTD), that are within a certain margin**UE RxTx ‘timing error group’ (UE RxTx TEG)**: Rx timing errors and Tx timing errors, associated with UE reporting of one or more UE Rx-Tx time difference measurements and one or more UL SRS resources for positioning purpose, that are within a certain margin**TRP Tx ‘timing error group’ (TRP Tx TEG)**: Tx timing errors, associated with TRP transmissions on one or more DL PRS resources, that are within a certain margin**TRP Rx ‘timing error group’ (TRP Rx TEG)**: Rx timing errors, associated with TRP reporting of one or more UL measurements, that are within a certain margin**TRP RxTx ‘timing error group’ (TRP RxTx TEG)**: Rx timing errors and Tx timing errors, associated with TRP reporting of one or more gNB Rx-Tx time difference measurements and one or more DL PRS resources, that are within a certain margin | **RAN1 provides further clarifications and confirmation on the definition;** |
| **Periodic Tx TEG reporting/TEG change procedure**According to RAN1 LS in R2-2200092: For UL-TDOA, "* + *Based on a configured periodicity, a UE may report the UE Tx TEG association for the SRS resources for positioning that have already been transmitted during the configured period*
		- *It is up to RAN2 to decide how to indicate the change of the Tx TEG association during the configured period (e.g., using the timestamps)*
		- *It is up to RAN4 to decide when the Tx TEG association is changed*
	+ *The values of the configurable periodicities are up to RAN2*

". what is needed seems an a-periodic report (i.e., a report when the TEG association has changed). **Issue:** RAN1 already agreed that periodic reporting for UL-TDOA should be supported, what is the purpose of periodically reporting the same information? Or only a-periodic report is required (i.e., a report when the TEG association has changed)? | **RAN1 provides further clarifications on the issue;** |
| **PRU** | RAN2 has agreed that RAN2 will not discuss PRUs further without further guidance from RAN1 (LS or feature list). | **RAN1 to decide whether PRU is supported in Rel-17;** |
| **Preconfigured MG** | The gNB may activate the pre-configurated measurement gap upon receiving the request from a UE or LMF."**Issue:** FFS on whether MG activation/deactivation request from the LMF can also be applicable to R16 MG configuration in addition to positioning MG preconfiguration, i.e. Can LMF ask the gNB to configure the MG (e.g. via RRC) directly? | **RAN1 provides further clarifications on the issue;** |
| **PRS processing window** | **Issues:** FFS:Whether PRS processing window configuration is provided per BWP or not is up to RAN1 to decide.FFS: Whether UE can be configured with multiple PRS processing windows should be decided by RAN1.FFS on the max number of PPW configurations (from Stage 2 discussion)FFS: whether UE should monitor PDCCH during RAR window/msgB window ot contention resolution timer for the affected symbols by PPW | **RAN1 provides further clarifications on the issue;** |
| **DL-AOD**  | **For RAN1 agreements “The requested PRS measurement can be DL PRS RSRP and/or path PRS RSRP. ”, is there a need to request and provide only the RSRPP measurements for the additional measurements (without legacy RSRP)?** | **RAN1 provides further clarifications on the issue** |
| As for the expected angle value and uncertainty information interaction between LMF and UE, RAN2 made the following agreements (RAN2#116bis).

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| * **Proposal 2.1-6: enhance LPP assistance data signalling to allow UE to request and LMF to provide the expected angle value and uncertainty.**
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**RAN2 understand “angle assistance information ” applies for DL-AOD positioning method. It is unclear to RAN2 on whether it also applies for DL-TDOA and Multi-RTT?** | **RAN1 provides further clarifications on the issue** |
| **FFS in RAN1 parameter list** |  | **RAN1 to resolve the FFFs.** |
| **FFS in RAN1 UE feature list** |  | **RAN1 to resolve the FFFs.** |

**2. Actions:**

**To RAN WG1**

**ACTION:**

* RAN2 respectfully asks RAN1 to take the above into account and provide feedback on RAN2’s questions.

**3. Date of Next RAN WG2 Meetings:**

RAN2#118-e 16 – 27 May 2022 Electronic meeting

RAN2 #119-e 22– 26 August 2022 Electronic Meeting